WHAT IS CLAIMED IS:

1. A method of manufacturing an optical fiber, the optical fiber comprising a core and a cladding and having a maximum relative refractive index difference of the core with the cladding of 0.3% to 0.5% and a mode field diameter of 8 micrometers to 10 micrometers at a wavelength of 1310 nanometers, comprising:

heating at least a portion of an optical fiber preform;

drawing an optical fiber at a speed of 500 meters per minute or more from the optical fiber preform heated; and

impressing a spin on the optical fiber, while drawing, alternately in a clockwise direction and in a counterclockwise direction with a predetermined angle in such a manner that a maximum spatial frequency "y" of the spin per meter satisfies a relationship of

$$\exp(24x-12) \leq y \leq 4$$

where "x" is non-circularity of the cladding in percent, and that a polarization mode dispersion of the optical fiber manufactured is 0.5 $ps/km^{1/2}$ or less at the wavelength of 1310 nanometers.

2. An apparatus for manufacturing an optical fiber, the optical fiber comprising a core and a cladding and having a maximum relative refractive index difference of the core with the cladding of 0.3% to 0.5% and a mode field diameter of 8 micrometers to 10 micrometers at a wavelength of 1310 nanometers, comprising:

a drawing capstan that draws the optical fiber at a speed of

500 meters per minute or more; and

a plurality of guide rollers that guides the optical fiber being drawn, wherein

one of the guide rollers oscillates at a predetermined speed with a predetermined angle to impress a spin on the optical fiber, while drawing, alternately in a clockwise direction and in a counterclockwise direction, in such a manner that a maximum spatial frequency "y" of the spin per meter y satisfies a relationship of

$$\exp(24x-12) \leq y \leq 4$$

where "x" is non-circularity of the cladding in percent, and that a polarization mode dispersion of the optical fiber manufactured is 0.5 $ps/km^{1/2}$ or less at the wavelength of 1310 nanometers.